REMARKS

The Examiner is thanked for his conversation with the Applicant's representative on February 26, and 27, 2004 and April 1, 2004, and for indicating that claims 6-9 and 19-22 contain allowable subject matter, removing all of the art rejections of the previous Office Action.

Attached are an Interview Summary, the response filed on September 25, 2003 and faxed again on February 26, 2004, and a coversheet for the facsimile of February 26, 2004.

STATUS OF CLAIMS

Claims 1- 36 are pending in the case. Claims 1-28 are original claims, and claims 29-36 are new claims. No claims are amended.

CLAIM REJECTIONS – 35 U.S.C. § 102 and § 103

The Examiner rejected claims 1-4, 10-17 and 23-28 under 35 U.S.C. §102(e) as allegedly anticipated by Hsu (U.S. Patent No. 6,363,318). The Examiner also rejected claims 5 and 8 under 35 U.S.C. §103 as allegedly unpatentable over Hsu in view of Chang (U.S. Patent Application Publication No. 2003/0123448). These rejections are respectfully traversed.

Declaration under 37 CFR § 1.131

Attached are (1) a Declaration under 37 CFR § 1.131 and (2) a supporting redacted disclosure document. The Office Action (at page 2) stated,

> The evidence submitted is insufficient to establish a conception of the invention prior to the effective date of the Hsu reference.

However, the declaration and response do not mention anything about "conception of the invention". Instead the Applicant's submitted evidence of and argued that the present invention was reduced to practice prior to the date of Hsu.

The Office Action (at page 2) further states,

> The Virtual Dynamic Backbone Protocol (VDBP): Technical Specification by Ryu et al cited to antedate the Hsu reference is not relevant to the claimed invention. The document does not credit the inventor of the instant application as being the author of the VDBP specification. Further the submitted VDBP document describes an invention separate from the invention disclosed in the instant application.

However, the supporting document filed on September 25, 2003 has the title, "Method of determining a datalink path in a managed network". The Applicant's never filed, "The Virtual Dynamic Backbone Protocol (VDBP): Technical Specification by Ryu et al" cited by the Office Action. Apparently, there was a mix up in the mailroom of the US Patent and Trademark Office, and somehow "The Virtual Dynamic Backbone Protocol (VDBP): Technical Specification by Ryu et al" was placed in the present application instead of the "Method of determining a datalink path in a managed network". Possibly, the mailroom also placed the wrong Declaration or other incorrect documents in the application with the response filed September 25, 2003.

Additionally, as stated in the prior response filed on September 25, 2003, the filing date of Hsu, which is August 31, 1999, is less than one year prior to the filing of the

present Application, which is March 14, 2000, and therefore does not constitute a statutory bar. The effective date of Hsu as a reference is August 31, 1999. The Declaration avers the existence, prior to the effective date of Hsu as a reference, of a working version of subject matter that is an embodiment of the claims. The existence of a working version of the claimed invention constitutes a reduction to practice. Thus, the declaration in-and-of-itself evidences that the claimed invention was conceived and reduced to practice prior to the effective date of Hsu as a reference.

The disclosure document describes subject matter that is an embodiment of the claimed invention, and in page 8, the disclosure document states

> Cisco Use: This method is currently being used in Cisco PathTool to determine the layer 2 path.

Since the Declaration avers that the disclosure document was written before the filing date of Hsu, the disclosure document (which is redacted in accordance with MPEP 715.07, p. 700-231) is further evidence that the claimed invention was reduced to practice prior to the filing date of Hsu. Further, the Declaration avers that the date of the disclosure document is prior to the filing date of Hsu. Thus, the Declaration, when combined with the disclosure document, is a showing of facts that are of a character and weight as to establish reduction to practice prior to the effective filing date of the reference. Accordingly, Hsu should be removed as a reference, and the rejection under 35 USC § 102(e) and § 103 should be withdrawn.

OBJECTION TO CLAIMS 6-9 AND 19-22

Since the rejection of the base claims should be removed, the objection to claims 6-9 and 19-22 as depending upon rejected base claims should also be withdrawn.

NEW CLAIMS

As stated in the prior response filed on September 25, 2003, each of new claims 29-36 depend on one of claims 1 and 14. Since Hsu should be removed as a reference regarding the base claims of 1 and 14, therefore claims 29-36 are also allowable. Additionally, the passages of Hsu cited by the Examiner never disclose or suggest (1) using Hsu's method for monitoring, as recited in claims 29 and 33, (2) using Hsu's method for obtaining diagnostic information, as recited in claims 30 and 34, (3) using Hsu's method for tracing a path at level 2, as recited in claims 31 and 35, or (4) that Hsu's method determines a verifiable path that is in a bridge forwarding table, as recited in claims 32 and 36. Further, the title of Hsu is "Constraint-Based Route ***Selection*** Using Biased Cost" (emphasis added), indicating that Hsu uses his method for selecting a route (that presumably was not previous determined), and not for monitoring, obtaining diagnostic information, tracing a path, or determining a path that could have been verified by a comparison with a bridge forwarding table.

REQUEST FOR A CORRECTED OFFICE ACTION RESTARTING THE PERIOD FOR REPLY

MPEP 710.06 states

> Where ... an Office action contains some ... defect and this error is called to the attention of the Office within 1 month of the mail date of the action, the Office will restart the previously set period for reply to run from the date the error is corrected, if requested to do so by applicant.

The Office Action contains a defect in that it responds to material not filed by the Applicant. As pointed out in the Interview Summary, in a telephone call on February 26, 2004, which is less than a month after the mailing of the Office Action, the Examiner was

in possession of the wrong document. The correct documents were faxed on February 26, 2004. Along with the correct documents, a copy of the filing receipt, return postcard, and transmittal coversheet were also faxed. The copy of the filing receipt, return postcard, and transmittal coversheet (in conjunction with the page counts on the return postcard) evidence that the correct documents were in fact included in the original response filed on September 25, 2003. Therefore, the Patent and Trademark Office was notified that there was a defect in the Office Action within a month of the mailing of the Office Action, and a corrected Office Action resetting the period for reply should be issued in accordance with MPEP 706.10.

CONCLUSIONS AND MISCELLANEOUS

The Applicant's believe that all issues raised in the Office Action have been addressed and that allowance of the pending claims is appropriate. Entry of the amendments herein and further examination on the merits are respectfully requested.

The Examiner is invited to telephone the undersigned at (408) 414-1213 to discuss any issue that may advance prosecution or any other issues related to this application.

No fee is believed to be due specifically in connection with this Reply. To the extent necessary, Applicant's petition for an extension of time under 37 C.F.R. § 1.136. The Commissioner is authorized to charge any fee that may be due in connection with this Reply to our Deposit Account No. 50-1302.

Respectfully submitted,

HICKMAN PALERMO TRUONG & BECKER LLP

Dated: April 2, 2004

David Lewis
Reg. No. 33,101

1600 Willow Street
San Jose, California 95125-5106
Telephone No.: (408) 414-1080
Facsimile No.: (408) 414-1076

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Auto-Reply Facsimile Transmission

TO: Fax Sender at 4084141076

Fax Information
Date Received: 4/8/2004 4:47:53 PM [Eastern Daylight Time]
Total Pages: 44 (including cover page)

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Received Cover Page =======>

04/08/2004 12:44 4084141076 HPTB SAN JOSE CALIFO PAGE 31/44

HICKMAN PALERMO TRUONG & BECKER LLP
1600 Willow Street
San Jose, CA 95125-5106
(408) 414-1080
Facsimile (408) 414-1076

FACSIMILE

FROM:

Patent Agent: David Lewis — Direct Phone: 408-414-1080 ext 202
Agent's E Mail: dlewis@hptb law.com — Sender's Fax: San Jose, CA (408) 414-1076
By Secretary: Teresa Austin — Direct Phone: 408-414-1080 ext 217
Re: Reply to Office Action — Date: April 8, 2004 — Time Sent:
Serial No : 09/524,725, filed March 14, 2000 — Number of pages including this page: 44

TO:

Name	Company	Facsimile No.	Contact No.
Christopher M. Swickhamer	United States Patent and Trademark Office, GAU 2662	703-872-9306	703-306-4820

Pursuant your request we fax the following documents to the above number, we attach copies of the following documents previously faxed to you on April 2, 2004.

INCLOSURES:

1) Reply to Office Action (7 pgs)
2) Interview Summary (3 pgs)
3) Copy of Return Acknowledgment Postcard (showing receipt by United States Patent and Trademark Office on December 1, 2003) (1 pg)
4) Copy of check in the amount of $144.00
5) Copy of Amendment and Response Transmittal (2 pgs)
6) Copy of Reply to Office Action (15 pgs)
7) Copy of Declaration of Inventor (4 pgs)
8) Copy of Disclosure Document including cover sheet (10 pgs)

CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office Fax No. (703) 746-9571.

On April 2, 2004 By Teresa Austin
Teresa Austin

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Mehryar Garakani

Serial No.: 09/524,725

Filed: March 14, 2000

For: METHOD OF DETERMINING A DATA LINK PATH IN A MANAGED NETWORK

Group Art Unit No.: 2697

Examiner: Christopher M. Swickhamer

Mail Stop AF
Commissioner of Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Interview Summary

On February 26, and 27, 2004 and April 1, 2004 the Applicant's representative, David Lewis, conferred with Examiner Swickhamer regarding the Declaration, supporting documentation, the Office Action, and whether another communication from the Examiner was forthcoming.

Specifically, on February 26, 2004, the Applicant's representative called the Examiner to discuss the Affidavit and supporting documentation, because the Applicant's representative did not understand the remarks on page 2 of the Office Action. However,

CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office Fax No. (703) 746-9571.

On April 2, 2004 By Teresa Austin
Teresa Austin

after a few minutes of conversation it became apparent that the Examiner was in possession of the wrong documents, which was verified by the Examiner reading the title of the supporting document before him, which was "The Virtual Dynamic Backbone Protocol (VDBP): Technical Specification by Ryu et al". That evening a second copy of the documents filed on September 25, 2003 was faxed to the Examiner. Included in the facsimile were a copy of the filing receipt, return postcard (which includes a page count for the each of the documents), and transmittal sheet, which (in conjunction with the page counts) evidence that the documents faxed were filed on September 25, 2003 and *not* "The Virtual Dynamic Backbone Protocol (VDBP): Technical Specification by Ryu et al". The next day the Applicant's representative called the Examiner to verify that the facsimile was received. Before getting off the phone, the Applicant's representative remarked that he would be looking forward to another communication from the Examiner regarding the correct papers filed on September 25, 2003 to which the Applicant's representative thought the Examiner responded in the affirmative.

However, after not receiving any communication from the Examiner, on April 1, 2004, the Applicant's representative called the Examiner to ask if any communication had been sent, or if no communication had been sent, when could one be expected. (Apparently, the Examiner did not recall saying, or did not intend to say, something to the effect that a communication would be forthcoming during the conversation of February 27, 2004.) After consulting with his supervisor the Examiner stated that the facsimile was considered only a draft of a response, and that a formal response was still necessary.

No fee is believed to be due specifically in connection with this Reply. To the extent necessary, Applicant's petition for an extension of time under 37 C.F.R. § 1.136. The Commissioner is authorized to charge any fee that may be due in connection with this Reply to our Deposit Account No. 50-1302.

Respectfully submitted,

HICKMAN PALERMO TRUONG & BECKER LLP

Dated: April 2, 2004

David Lewis
Reg. No. 33,101

1600 Willow Street
San Jose, California 95125-5106
Telephone No.: (408) 414-1080
Facsimile No.: (408) 414-1076

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Acknowledgment Receipt

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Mailing Date: November 26, 2003 Attorney: DL/ta/ss GED

Attorney Docket No. 50325-0088 First-Class Mail

Serial No.: 09/524,725

Inventor(s): Mehryar Garakani

Title: METHOD OF DETERMINING A DATA LINK PATH IN A MANAGED NETWORK

Documents Enclosed: ate)

1) Reply to Office Action (15 pgs)
2) Declaration of Inventor (4 pgs)
3) Disclosure Document including cover sheet (10 pgs)
4) Amendment and Response Transmittal (2 pgs) (in duplicate)
5) Check in the amount of $144.00
6) Return Acknowledgment Postcard

bove documents.

Kindly stamp the receipt date and return to addressee to acknowledge receipt of the above documents.

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90-4228/1211

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Docket No.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Mehryar Garakani

Serial No.: 09/524,725

Filed: March 14, 2000

For: METHOD OF DETERMINING A DATA LINK PATH IN A MANAGED NETWORK

Group Art Unit No.: 2697

Examiner: Christopher M. Swickhamer

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Transmitted herewith is a Reply to Office Action in the above identified application.

☒ Also attached: Declaration of Inventor and Disclosure Document

☒ Return Receipt Postcard.

The fee has been calculated as shown below:

	NO. OF CLAIMS	HIGHEST PREVIOUSLY PAID FOR	EXTRA CLAIMS	RATE	FEE
Total Claims	36	28	8	$18.00 =	$144.00
Independent Claims	4	4	0	$86.00 =	$0.00
		Multiple claims newly presented			$0.00
		Fee for extension of time			$144.00
		TOTAL FEE DUE			$144.00

☒ Enclosed is a check in the amount of $144.00. Please charge any and all deficiencies to Deposit Account No. 50-1302. An additional copy of this transmittal sheet is submitted herewith.

☒ The Commissioner is hereby authorized to charge payment of any fees associated with

this communication or credit any overpayment, to Deposit Account No. 50-1302, including any filing fees under 37 CFR 1.16 for presentation of extra claims and any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,

HICKMAN PALERMO TRUONG & BECKER LLP

David Lewis

David Lewis
Agent of Record
Registration No. 33,101

1600 Willow Street
San Jose, CA 95125
(408) 414-1080 EAB:ss
Date: November 26, 2003
Facsimile: (408) 414-1076

CERTIFICATE OF MAILING

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on November 26, 2003 by Sheila Severinghaus

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Mehryar Garakani

Group Art Unit No.: 2697

Examiner: Christopher M. Swickhamer

Serial No.: 09/524,725

Filed: March 14, 2000

For: METHOD OF DETERMINING A DATA LINK PATH IN A MANAGED NETWORK

Commissioner of Patents
P. O. Box 1450
Alexandria, VA 22313-1450

REPLY TO OFFICE ACTION

Sir:

This is in response to the Office Action mailed September 25, 2003, the shortened statutory period for which runs until December 25, 2003.

Additional Claims and Remarks are presented on separate sheets below.

AMENDMENTS TO THE CLAIMS

1. (Original) A method for determining a logical path in a managed network between a source device and a destination device at a data link layer, the method comprising the computer-implemented steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

2. (Original) The method as recited in Claim 1, wherein the managed network is a managed IP network.

3. (Original) The method as recited in Claim 1, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:

identifying a set of Connected Group nodes associated with the Connected Group Space representation;

identifying Connected Group links that connect the Connected Group nodes; and

creating and storing information that represents the Connected Group links.

4. (Original) The method as recited in Claim 1, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:

identifying a subnet associated with the source device and the destination device;

determining a set of network links that link one or more network devices in the managed network; and

determining an assignment of ports of network devices.

5. (Original) The method as recited in Claim 1, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:

identifying all Virtual Local Area Networks (VLANs) associated with a subnet associated with the source device and the destination device; and

identifying all Emulated Local Area Networks (ELANs) associated with the subnet.

6. (Original) The method as recited in Claim 1, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:

creating one Connected Group node for any pairs of interfaces across a point-to-point link in the topology space representation;

creating one Connected Group node for any interfaces of the managed network that are directly connected by virtue of being on a same physical medium;

creating one Connected Group node for LAN Emulation interfaces on a same Emulated Local Area Network (ELAN);

creating one Connected Group node for each internal interface of any network device when the network device has an internal interface;

creating one Connected Group node for the source device;

creating one Connected Group node for the destination device; and

creating one Connected Group node for each user interface on any network device when the network device has a user interface.

7. (Original) The method as recited in Claim 6, further comprising the step of determining Connected Group links between Connected Group nodes in a subnet associated with the source device and the destination device.

8. (Original) The method as recited in Claim 7, further comprising the step of creating one Connected Group link for each pair of interfaces within each network device, wherein each interface is associated with the subnet of the source device and the destination device and is in a forwarding state.

9. (Original) The method as recited in Claim 8, further comprising the step of checking a spanning tree status for each interface within each network device to determine whether the interface is in the forwarding state.

10. (Original) The method as recited in Claim 1, wherein the step of identifying an optimized path in the Connected Group Space representation further comprises the step of finding a shortest path between a Connected Group source node and a Connected Group destination node.

11. (Original) The method as recited in Claim 10, further comprising the step of using a Dijkstra algorithm to find the shortest path between the Connected Group source node and the Connected Group destination node.

12. (Original) The method as recited in Claim 1, wherein the step of transforming the optimized path into the topology space representation further comprises the steps of:

identifying an ordered set of Connected Group nodes associated with the optimized path; and

identifying an ordered set of Connected Group links associated with the ordered set of Connected Group nodes.

13. (Original) The method as recited in Claim 12, further comprising the steps of:

identifying a pair of interfaces associated with each Connected Group link in the ordered set of Connected Group nodes associated with the optimized path; and

generating an ordered set of topology space links from the pairs of interfaces associated with Connected Group links.

14. (Original) A computer-readable medium carrying one or more sequences of instructions for determining a logical path in a managed network between a source device and a destination device at a data link layer, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

15. (Original) The computer-readable medium as recited in Claim 14, wherein the managed network is a managed IP network.

16. (Original) The computer-readable medium as recited in Claim 14, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:
identifying a set of Connected Group nodes associated with the Connected Group Space representation;
identifying Connected Group links that connect the Connected Group nodes; and
creating and storing information that represents the Connected Group links.

17. (Original) The computer-readable medium as recited in Claim 14, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:
identifying a subnet associated with the source device and the destination device;
determining a set of network links that link one or more network devices in the managed network; and
determining an assignment of ports of network devices.

18. (Original) The computer-readable medium as recited in Claim 14, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:
identifying all Virtual Local Area Networks (VLANs) associated with a subnet associated with the source device and the destination device; and

identifying all Emulated Local Area Networks (ELANs) associated with the subnet associated with the source device and the destination device.

19. (Original) The computer-readable medium as recited in Claim 14, wherein the step of creating and storing a Connected Group Space representation further comprises the steps of:

creating one Connected Group node for any pairs of interfaces across a point-to-point link in the topology space representation;

creating one Connected Group node for any interfaces of the managed network that are directly connected by virtue of being on a same physical medium;

creating one Connected Group node for LAN Emulation interfaces on a same Emulated Local Area Network (ELAN);

creating one Connected Group node for each internal interface of any network device when the network device has an internal interface;

creating one Connected Group node for the source device;

creating one Connected Group node for the destination device; and

creating one Connected Group node for each user interface on any network device when the network device has a user interface.

20. (Original) The computer-readable medium as recited in Claim 19, further comprising the step of determining Connected Group links between Connected Group nodes in a subnet associated with the source device and the destination device.

21. (Original) The computer-readable medium as recited in Claim 20, further comprising the step of creating one Connected Group link for each pair of interfaces within each network device, wherein each interface is associated with the subnet of the source device and the destination device, and is in a forwarding state.

22. (Original) The computer-readable medium as recited in Claim 21, further comprising the step of checking a spanning tree status for each interface within each network device to determine whether the interface is in the forwarding state.

23. (Original) The computer-readable medium as recited in Claim 14, wherein the step of identifying an optimized path in the Connected Group Space representation further comprises the step of finding a shortest path between a Connected Group source node and a Connected Group destination node.

24. (Original) The computer-readable medium as recited in Claim 23, further comprising the step of using a Dijkstra algorithm to find the shortest path between the Connected Group source node and the Connected Group destination node.

25. (Original) The computer-readable medium as recited in Claim 14, wherein the step of transforming the optimized path into the topology space representation further comprises the steps of:

identifying an ordered set of Connected Group nodes associated with the optimized path; and

identifying an ordered set of Connected Group links associated with the ordered set of Connected Group nodes.

26. (Original) The computer-readable medium as recited in Claim 25, further comprising the steps of:

identifying a pair of interfaces associated with each Connected Group link in the ordered set of Connected Group nodes associated with the optimized path; and

generating an ordered set of topology space links from the pairs of interfaces associated with Connected Group links.

27. (Original) A computer data signal embodied in a carrier wave, the computer data signal carrying one or more sequences of instructions for determining a logical path in a managed network between a source device and a destination device at a data link layer, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

28. (Original) A computer apparatus comprising:

a processor; and

a memory coupled to the processor, the memory containing one or more sequences of instructions for determining a logical path in a managed network between a source device and a destination device at a data link layer, wherein execution of the one or more sequences of instructions by the processor causes the processor to perform the steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

29. (New) The method of claim 1, further comprising the step of monitoring network devices by obtaining information about the network devices from information associated with the data linked path.

30. (New) The method of claim 1, further comprising the step of obtaining diagnostic information by obtaining information about the network devices from information associated with the data linked path.

31. (New) The method of claim 1, wherein the data link path is a trace of a path determinable from a bridge forwarding table.

32. (New) The method of claim 1, wherein the data link path is verifiable by comparing information related to the data link path to information from a bridge forwarding table.

33. (New) The computer readable medium of claim 14, wherein the instructions further comprise the step of monitoring network devices by obtaining information about the network devices from information associated with the data linked path.

34. (New) The computer readable medium of claim 14, wherein the instructions further comprise the step of obtaining diagnostic information by obtaining information about the network devices from information associated with the data linked path.

35. (New) The computer readable medium of claim 14, wherein the data link path is a trace of a path determinable from a bridge forwarding table.

36. (New) The computer readable medium of claim 14, wherein the data link path is verifiable by comparing information related to the data link path to information from a bridge forwarding table.

REMARKS

The Examiner is thanked for indicating that claims 6-9 and 19-22 contain allowable subject matter, removing all of the art rejections of the previous Office Action, removing the objection to the drawings, and removing the objection to the specification.

STATUS OF CLAIMS

Claims 1- 36 are pending in the case. Claims 1-28 are original claims, and claims 29-36 are new claims. No claims are amended.

CLAIM REJECTIONS – 35 U.S.C. § 102 and § 103

The Examiner rejected claims 1-4, 10-17 and 23-28 under 35 U.S.C. §102(e) as allegedly anticipated by Hsu (U.S. Patent No. 6,363,318). The Examiner also rejected claims 5 and 8 under 35 U.S.C. §103 as allegedly unpatentable over Hsu in view of Chang (U.S. Patent Application Publication No. 2003/0123448). These rejections are respectfully traversed.

Affidavit under 37 CFR § 1.131

Attached are (1) an Affidavit under 37 CFR § 1.131 and (2) a supporting redacted disclosure document.

The filing date of Hsu, which is August 31, 1999, is less than one year prior to the filing of the present Application, which is March 14, 2000, and therefore does not constitute a statutory bar. The effective date of Hsu as a reference is August 31, 1999. The Affidavit avers the existence, prior to the effective date of Hsu as a reference, of a

working version of subject matter that is an embodiment of the claims. The existence of a working version of the claimed invention constitutes a reduction to practice. Thus, the affidavit in-and-of-itself evidences that the claimed invention was conceived and reduced to practice prior to the effective date of Hsu as a reference.

The disclosure document describes subject matter that is an embodiment of the claimed invention, and in page 8, the disclosure document states

> Cisco Use: This method is currently being used in Cisco PathTool to determine the layer 2 path.

Since the Affidavit avers that the disclosure document was written before the filing date of Hsu, the disclosure document is further evidence that the claimed invention was reduced to practice prior to the filing date of Hsu. Further, the Affidavit avers that the date of the disclosure document is prior to the filing date of Hsu. Thus, the Affidavit, when combined with the disclosure document, is a showing of facts that are of a character and weight as to establish reduction to practice prior to the effective filing date of the reference. Accordingly, Hsu should be removed as a reference, and the rejection under 35 USC § 102(e) and § 103 should be withdrawn.

OBJECTION TO CLAIMS 6-9 AND 19-22

Since the rejection of the base claims should be removed, the objection to claims 6-9 and 19-22 as depending upon rejected base claims should also be withdrawn.

NEW CLAIMS

Each of new claims 29-36 depend on one of claims 1 and 14. Since Hsu should be removed as a reference regarding the base claims of 1 and 14, therefore claims 29-36 are also allowable. Additionally, the passages of Hsu cited by the Examiner never

disclose or suggest (1) using Hsu's method for monitoring, as recited in claims 29 and 33, (2) using Hsu's method for obtaining diagnostic information, as recited in claims 30 and 34, (3) using Hsu's method for tracing a path at level 2, as recited in claims 31 and 35, or (4) that Hsu's method determines a verifiable path that is in a bridge forwarding table, as recited in claims 32 and 36. Further, the title of Hsu is "Constraint-Based Route ***Selection*** Using Biased Cost" (emphasis added), indicating that Hsu uses his method for selecting a route (that presumably was not previous determined), and not for monitoring, obtaining diagnostic information, tracing a path, or determining a path that could have been verified by a comparison with a bridge forwarding table.

DISCLAIMER

The filing of the affidavit and the filing of new claims 28-32, neither affirms nor denies whether the rejections over art of claims 1-5, 10-18, and 23-28 would have been valid were the Affidavit not filed. The Applicant reserves the right to establish differences and/or similarities between Hsu and any of claims 1-5, 10-18, and 23-28.

CONCLUSIONS AND MISCELLANEOUS

The Applicants believe that all issues raised in the Office Action have been addressed and that allowance of the pending claims is appropriate. Entry of the amendments herein and further examination on the merits are respectfully requested.

The Examiner is invited to telephone the undersigned at (408) 414-1213 to discuss any issue that may advance prosecution or any other issues related to this application.

No fee is believed to be due specifically in connection with this Reply. To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. § 1.136. The Commissioner is authorized to charge any fee that may be due in connection with this Reply to our Deposit Account No. 50-1302.

Respectfully submitted,

HICKMAN PALERMO TRUONG & BECKER LLP

Dated: November 26, 2003

David Lewis
Reg. No. 33,101

1600 Willow Street
San Jose, California 95125-5106
Telephone No.: (408) 414-1080
Facsimile No.: (408) 414-1076

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

on November 26, 2003 by ____________
(Date) (Signature)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	**Confirmation Number:** 8997
Mehryar Garakani	**Group Art Unit:** 2697
Serial No.: 09/524,725	**Examiner:** Christopher M Swickhamer.
Filed: March 14, 2000	
For: METHOD OF DETERMINING A DATA LINK IN A MANAGED NETWORK	

DECLARATION OF INVENTOR PURSUANT TO 37 C.F.R. 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Sir:

I, Mehryar Garakani, declare as follows:

1. I am the named inventor of the above-identified patent application and I am familiar with the claimed invention.

2. Prior to August 31, 1999, I had developed a working version of an embodiment of the invention in the United States, and documented a written description of an embodiment of the invention in the United States.

3. I have reviewed the currently pending claims 1-5, 10-18, and 23-28 of the application, and to the best of my recollection, the working version that I developed and the written documentation that I wrote prior to August 19, 1999 is for an embodiment of the invention that is within the scope of claims 1-5, 10-18, and 23-28. Independent claims 1, 14, 27, and 28 are set forth below:

1. A method for determining a logical path in a managed network between a source device and a destination device at a data link layer, the method comprising the computer-implemented steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

14. A computer-readable medium carrying one or more sequences of instructions for determining a logical path in a managed network between a source device and a destination device at a data link layer, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

27. A computer data signal embodied in a carrier wave, the computer data signal carrying one or more sequences of instructions for determining a logical path in a managed network between a source device and a destination device at a data link layer, wherein execution of the one or more sequences of instructions by one or more processors causes the one or more processors to perform the steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

28. A computer apparatus comprising:

a processor; and

a memory coupled to the processor, the memory containing one or more sequences of instructions for determining a logical path in a managed network between a source device and a destination device at a data link layer, wherein execution of the one or more sequences of instructions by the processor causes the processor to perform the steps of:

creating and storing a Connected Group Space representation of network devices based on a topology space representation of the network devices;

identifying an optimized path in the Connected Group Space representation;

transforming the optimized path into the topology space representation; and

creating and storing the optimized path that was transformed into the topology space representation as the data link layer path.

4. Attached as Exhibit 1 is a technical document, which is at least part of the written documentation that I wrote, and which additionally evidences that I had a working embodiment of

the above-identified application, before August 19, 1999. Exhibit 1 is an invention disclosure describing the background, summary of operation, and advantages of an embodiment of the claimed invention. Certain dates and names have been redacted from the document of Exhibit 1, as permitted by applicable laws and rules of the U.S. Patent & Trademark Office; however, Exhibit 1 was written long prior to August 19, 1999.

5. I declare that all statements made herein of our own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of title 18 of United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: Nov 11, 2003 By: Mehryar Garakani

Mehryar Garakani

Disclosure Document

This report contains the following 1 ideas:

Idea No.	Title	Inventors	Entered	Updated
45781	Method of determining a data link path in a managed network	Mehryar Garakani (mgarakan)		

CISCO CONFIDENTIAL

Method of determining a data link path in a managed network

CPOL No.: 45781	Seq No.: 1507	Status: Pending	Submitted:	Modified:

Idea Details

Inventors:

Mehryar Garakani (mgarakan) **Phone:** 805 961-3640 **Manager:** **Dept:** DSP Protocols

Type: Regular **Division:**SVS **Site:** -- **Info:** --

Background: Terminology

Layer 2: Refers to layer 2 (data link layer) of ISO networking model

Layer 3: Refers to layer 3 (network layer) of ISO networking model

Vlan: A Virtual LAN consisting of a subset of ports/interfaces on various devices that are part of the same "broadcast domain"

Elan: An Emulated LAN consisting of a subset of ports/interfaces on an ATM fabric that are part of the same "broadcast domain"

Broadcast Domain: A "layer 2" LAN that can consist of multiple virtual LANs, emulated LANs, or physical LAN segments

Subnet: A "layer 3" IP subnet. Typically this is associated with a Broadcast Domain, although the association need not be one to one

NMS: A network management station that collects, analyzes, and displays data on the status of the network and its constituent devices

Bridge: This is used in its more generic sense here. It refers to any device that performs a "layer 2" bridging function from one physical or emulated LAN segment to another. This includes LAN switches, routers having Bridge Groups. For the purposes here it also covers physical layer repeaters (hubs) although technically speaking this is not a common usage for this term.

Topology: A logical map of how each device in a managed network is connected to other neighboring devices. It can be visualized on a diagram that shows the devices and links.

Assume we have a managed IP network that consist of routers, switches, hubs, and other "layer 2" or "layer 3" devices. Furthermore, assume that the following Info items are known about the managed network by the NMS:

Info-1) Topology,
Info-2) Vlan assignment of ports and interfaces,
Info-3) Elan assignment of ports and interfaces,
Info-4) Vlan and elan association with subnets/broadcast domains (i.e., we know which set of vlans and/or elans are part of a given subnet or broadcast domain),
Info-5) Spanning Tree status (FORWARDING, etc.) of each port/interface participating in Spanning Tree Protocol (STP),
Info-6) Bridge Forwarding Table information on LAN switches,
Info-7) End-Station discovery (based on matching ARP Tables entries on routers with Bridge Tables entries on LAN switches) to locate end-station devices (i.e., PCs, workstations, etc.).

The question arises as how can the "layer 2" path for an IP packet involving various devices in this managed network be determined. The "layer 2" path can include multiple "layer 2" LAN switches or hubs (i.e., repeaters), it may also include routers (e.g., router bridge groups).

If we were only interested in the "layer 3" path from one router port to the next, this information could be obtained through the widely available traceroute program in many circumstances (particularly straight forward if the program is run from the source node rather than running from a remote NMS, although doing the later can also be accomplished with the "source routed traceroute" once the first layer 3 hop from source towards destination is determined).

However, the traceroute program is limited in that it can only identify the "layer 3" path. The program works because of the support incorporated into IP protocol for Time To Live (TTL) field and generation of ICMP packets when TTL expires on a packet that has been routed more than the allowed TTL. This allows traceroute program to directly trace the path, by having feedback from devices along the path.

Similar direct tracing support for "layer 2" data link layer protocols across the wide range of technologies, including Ethernet, Lane, Token Ring, EtherChannel, etc. does not exist. Hence the solution needs to be obtained based on the information that can be gathered from the devices by NMS (i.e., those listed in the seven categories above).

Needless to say that this is a significant problem as the ability to determine the layer 2 path in a managed network can be important for network monitoring and diagnostics. This is particularly the case as layer 2 switches are replacing routers in the distribution layer and elsewhere in the networks, and hence layer 3 path traces that jump over from one router port to another can leave a big hole in determining the actual path travelled by a packet from one device to the next.

It should be noted that the layer 2 path fits on top of the Topology map which is assumed known by the NMS. However, knowing Topology itself is not sufficient to know the actual layer 2 path, as there are a typically a large number of solutions that can be overlayed on top of Topology to connect the source device to the destination device.

We can consider the Topology (T) in an abstract sense to be a set of nodes (N) which represent devices and links (L) which join devices together through point-to-point or shared mediums.

To illustrate the problem and or for simplicity we shall make a simplifying assumption regarding Topology initially. Let's make the assumption that the links between devices are point-to-point, e.g., 10BaseT Ethernet, serial links, etc. We will waive this assumption before presenting the solution which would apply to the more generic case.

Each link L is associated with a device port (P1) on one side and a device port (P2) on the other side. We shall see later that ports do not need to be external physical ports, we can consider them to also represent a logical interface or even an internal port when communicating with a device that has an IP address associated with an internal port (e.g., a LAN switch). For now, let's assume all ports are external physical ports.

In this simplified form the problem is to determine the "layer 2" path from some a source port (S) to some destination port (D). The layer 2 path in the above simplified network is the ordered set of all Links (L1, L2, L3, ...) that are traversed from S to D as the packet is going through various bridging devices (such as LAN switches or repeaters). So determining the Layer 2 path (P) is equivalent to determining the ordered set (L1, L2, L3, ...) that is traversed along from one device to the next.

So how can this ordered set be determined? Is this the shortest path on the Topology ? The answer is clearly no. The two devices can be adjacent in the topology (i.e., may be only one hop away in terms of connectivity). However, the actual path the packet takes is constrained by vlan/elan relationships as well as by Spanning Tree configuration.

This could result in a packet to hop along many "layer 2" devices before finally reaching its nearby destination. So although the two devices may be only one hop away in the Topology sense, the actual Level 2 path may consist of many more hops (sort of like traveling from Los Angeles to San Francisco via New York).

This occurs because packet flow is constrained according to the following considerations:

1) Packets would not be bridged on a bridge device from one port to another, unless the two ports are assigned to carry traffic for the same vlan or a translationally related vlan or a binded elan (strictly speaking this is only true as long as the bridge device is performing a standard bridge function and not a routing function or multi-layer switching (MLS). The MLS switches can be considered within the framework presented here, but we will only consider standard switches that do not have MLS

capability in order to provide the simplest presentation of the basic approach.

2) Packets would flow along links that are in Spanning Tree forwarding state and not along links that are blocked. Since the Spanning Tree Protocol generally prefers paths that have a lower cost (e.g., a higher bandwidth), this may not necessarily be the shortest path on the Topology.

The solution presented will be discussed in term of IP networks, although the solution need not be limited to IP and can be applicable to other networking protocols.

Prior Art: ---

Summary: A fact that is noteworthy regarding this problem is that in a functional
network, there is only one unique solution (one 12 path) from source to destination (due to Spanning Tree blocking of redundant paths). This is suggestive of optimization problems, such as minimization or maximization problems.

However, there is a difference in that the solution does not appear as a minimization or maximization problem when looked at in the Topology space. As stated above, the actual path need not be the shortest path in the Topology space (and not the longest path either). This is unfortunate, as there are known algorithms that can be used to find the solution for optimization problems involving a connected network.

The approach that is presented here offers a solution to this problem. It achieves this by transforming the problem from the Topology space into an artificial space called Connected Group (CG) space, whose sole purpose is that it transforms the path finding problem into an optimization problem, whose solution can then be obtained by standard algorithms such as Dijkstra.

Below is provided specific recipe for how such a transformation of the problem can be achieved. The basic procedure can be stated as follows:

1) Based on the information known to NMS, construct a CG space that represents the given path tracing problem,

2) Identify an optimized (shortest path) in the CG space that is an analog (equivalent) of the actual path in the Topology space.

3) Once the solution is found in the CG space, transform the solution back to the Topology space, out of which pops out the ordered set of links (L1, L2, ...) that represents the layer 2 path.

Having stated the problem above in the simplified form by assuming that the links between the devices are point-to-point, now we shall relieve this assumption in order to present a solution that is generic and applies

to point-to-point links as well as when multiple devices are connected through a shared medium.

In this case the topology view is more complex as multiple devices show up connected on the same spot (i.e., the shared medium), however, the path is still an ordered set of links (L1, L2, ...), and our goal is to find it.

The solution presented here covers this more generic case, and is applicable to shared media (e.g. 10Base2) as well as to emulated LANs, e.g. those achieved through ATM LAN Emulation, which can also be thought of as a shared emulated media, as long as we look at the ATM Fabric associated with a particular Elan as a single cloud and not be concerned with the specific cell switching path through the ATM Fabric (i.e., in this case the layer 2 path that is determined would jump over the fabric from one edge device port to another).

The various steps of the procedure above are described below:

1) Constructing the CG space. Just like the topology space the CG space includes a set of nodes (M) that are linked by a set of links (K). However, there are differences in semantics of what a node and a link means in CG space as opposed to the Topology space.

   In CG space, a node can be called a "Connected Group" and is created for any one of the followings:

   a) a pair of ports joined across a point-to-point link on Topology (e.g. a 10BaseT link from a LAN switch to a repeater),

   b) a set of ports that are directly connected, because they sit on a shared physical medium (such as a 10Base2 cable),

   c) a set of Lane interfaces on an elan on an ATM fabric,

   d) an internal port for devices that have internal IP addresses not associated with any of their physical ports (e.g., LAN switches),

   e) a "user port" on a bridge device (i.e., a port that is not connected to any other networking devices, but may have end-stations sitting behind it).

   A node in CG space represents a single port or a connected group of ports (i.e., can be any one of the five items above), unlike a node in the Topology space (which represents a device). The key in understanding a node in CG space is that it is a set of one or more physical, virtual or emulated port/interfaces that are directly connected to other members of the "Connected Group" (if it has more than one member), but for a packet to move from one "Connected Group" to another it must traverse one or more bridging devices.

   The opposite is true for packets going from one port/interface on a Connected Group to another port/interface within the Connected Group. In this case, no bridge devices are needed (this excludes the ATM switches that participate in creating an emulated LAN, as the whole ATM fabric can be viewed as a broadcast entity for each elan).

A question arises as which CG nodes need to be included in CG space. The answer is we need to include a CG node for any item which fits in one of the above 5 categories (a through e) and is associated with the given broadcast domain (or subnet) that we are interested in.

In particular a CG node needs to always be created for source and destination of a layer 2 path. For end-stations the later requires knowledge of which LAN switch port an end-station is behind; this does depend on end-station discovery function of NMS, which was mentioned above (i.e., Info-7). For the purpose of this discussion the CG node associated with the source is refered to as "source CG node" and that of the destination is refered to as "destination CG node". The "source CG node" and "destination CG node" may be one and the same, if the source port and destination ports are on the same Connected Group.

The first step to construct the CG space is to determine the subnet that we are interested in. The subnet can be determined from the "layer 3" trace and by looking at RFC-1213 mib values associated with the "layer 3" interfaces. It was assumed earlier that the NMS can then map this subnet to a broadcast domain, which includes the set of all vlans and elans that are associated with this subnet. The Topology elements that are associated with this set of vlans and/or elans that fit into one of the above five categories can then be used to determine the CG nodes that must be included.

Determining the whole set of CG nodes for a given path tracing problem relies on Info items from NMS which were listed above, in particular Info-1, Info-2, Info-3, Info-4, and Info-7.

Once the CG nodes are determined, the next step is to determine the links between CG nodes. The CG links are all point-to-point (even when Topology includes shared media). Unlike a Topology link, which links two ports on two separate devices, a CG link corresponds with a bridging link that joins two ports on a single bridge device.

CG nodes are joined by point-to-point CG links that are determined as follows. Each bridge device that has ports on the given broadcast domain contributes to a set of CG links. The total set of CG links that are included in the CG space, are the union of all sets from each bridge device that is associated with the broadcast domain.

So assume a bridge device has "m" ports (internal and external) that are associated with the given broadcast domain and are also in the STP forwarding state (i.e., not blocked by Spanning Tree). For each pair of ports on this set of "m" ports a single CG link is added to the CG space. Hence a device that has "m" ports on the broadcast domain would contribute m*(m-1) CG links to the CG space.

Each CG link joins a CG node to another (i.e., is point-to-point). The CG nodes to join are determined based on the association of the bridging ports, that are associated with the CG link, to their corresponding CG nodes.

To determine the CG links, the NMS info items Info-1, Info-2, Info-3,

Info-4, and Info-5 can be used.

Once all CG nodes and CG links are added, the CG space construction is complete and we can proceed to determine the path in the CG space as in step 2 below.

2) Having constructed the CG space the problem of finding the layer 2 path becomes a simple optimization problem, because in CG space the layer 2 path corresponds to the shortest path that joins the "source CG node" with the "destination CG node". Under normal circumstances, when all of the above information items from NMS are known and accurate there will always be a solution and only one solution to this optimization problem. Any other path in CG space that joins the "source CG node" with the "destination CG node" is bound to be longer by one or more hops.

To find the shortest path in CG space the Dijkstra algorithm can be used to identify the ordered set of CG nodes (M1, M2, M3, ..., Mx) traversed from source (M1) to destination (Mx) CG node, along the optimized path.

The ordered Dijkstra set of nodes is the solution in CG space. This needs to be translated back to the solution in the Topology space as discussed below in step 3.

3) The Dijkstra ordered set (M1, M2, M3, ..., Mx) identifies all Connected Groups along the path. Joining each pair of adjacent CG nodes in this path, e.g. (M1, M2) or (M2, M3) is a single Dijkstra link "K?" as was discussed in Step 1 above (the reason there is a unique link is due to the fact that redundant paths are blocked by Spanning Tree Protocol).

So from the ordered set of Dijkstra nodes we can simply generate the ordered set of Dijkstra links (K1, K2, K3, ..., K'x-1'). Each link is associates with a pair of ports on a bridge device as was described above. So once the set of Dijkstra links are known, this can be simply used to generate the set of all ports/interfaces that are traveresed. From the set of these ports/interfaces, we can then immediately generate the set of all links in Topology space (i.e., L1, L2, L3, ...) that constitutes the solution that we seeked.

Assuming that the NMS has consistent information about the network, and the network conditions are normal, the method above should be very effective in finding the layer 2 path. In cases where there is a question about the integrity or consistency of the NMS information, a verification step can be added as below whenever feasible.

Verification Step:

Once we have the solution from the method described above, the Bridge Forwarding Table (Info-6) can be used to verify the solution. This would require the knowledge of destination and source MAC addresses, which can be obtained by querying the router ARP tables (RFC 1213 MIB), as the forwarding tables are keyed off the MAC address.

To do this, for each bridge device along the path which is maintaining

a Bridge Forward Table, a query is made for the destination and source MAC addresses to obtain the incoming and outgoing ports. This is compared against the path that was found above to make sure they match. A mismatch though should be rare would rule out the solution found above (such mismatch can be possible, if NMS view of the network does not reflect reality).

This verification step is not required, but it can provide further assurance that all is well with the solution that has been obtained. The verification step is not always feasible as the Bridge Forwarding Tables age out old information, and unless there has been recent communication between source and destination devices the required information may not be found in the bridge table.

Restatement: ---

Advantages: Provides a simple yet powerful solution to a complex problem.

Cisco Use: This method is currently being used in Cisco PathTool to determine the
layer 2 path.

Public Use: None that I am aware of.

Detecting Use: Since path tracing for layer 2 requires a lot of induction based on
available information to NMS, etc., generally such tools would provide a window to how they go about achieving a solution, by providing log or trace messages, etc. This is done to give some assurance that the data used and the solution found are valid. Such can be used to detect use by other companies.

If some one is intent to use and hide, only access to source code may do.

Standards: ---

Technologies:

- Network Management
- WAN > Frame Relay

Networking Solutions:

- Large Enterprise > Networking Solutions for Large Enterprise > Switching Solutions for Large Enterprise
- Large Enterprise > Networking Solutions for Large Enterprise > Network Management Solutions for Large Enterprise

Categorization Notes:

Categories Summary
[Sw]

Supporting Documents:

- ---

Notes: ---